The investments in distribution and feeder cables and the digital loop carrier systems typically represent the majority of the investment in loop plant. Several other important loop components that are included in SLCS are:

Premises termination equipment (NID, drop cable, and terminal). Investments are computed for the network interface device, drop cables, and terminals. The investment include labor costs for installing the equipment and cable splicing.

Feeder distribution interface (FDI). The FDI investment represents the cost of the cabinet, equipment, and labor to provide the cross-connect point between the feeder and distribution cable.

Feeder stub. Investments for the feeder stub are based on the average feeder stub length and the installed cost/pair-foot.

Main Distribution Frame Stringer. Frame stringer investments include the cost of a protector unit and a protector block, the frame and lighting, the riser cable, and installation labor.

3.0 SLCS Input and Output

This section describes input data required by SLCS and the SLCS cost output information found in the Expanded Summary

Section 3.1 outlines in detail the user input, and yearly input worksheets, respectively. Input data consists of various cost drivers such as, material and equipment prices, labor rates, and fill factors. Cost output information, which is compiled in the Expanded Summary worksheet, is described in Section 3.2.

3.1 Input Data

As mentioned above, input for SLCS resides in two Excel® worksheets. The User Inputs worksheet assembles the inputs that vary from study to study. The Yearly Input worksheet includes information that is constant for every study and are updated annually or when necessary. Section 3.1.1 will define all user inputs and section 3.1.2 will define all yearly inputs.

3.1.1 User Input

This worksheet identifies the components of the cost study that vary from study to study. Figure 7 is a visual of how the User Inputs worksheet looks.

Figure 7 – User Inputs

USER INPUTS:

GENERAL

8db 2Wire	Loop Type
State	State
Study Area	Study Area
8db2w	Study Name
2002-2005	Planning Period

PERCENT UTILIZATION (FILL FACTOR)

62.00%	DLC		
44.00%	Distribution	1.1069	Lines per Premises
65.00%	Copper Feeder	18.45%	PremTerm - Res (6-term)
50.00%	Feeder Stub	22.14%	PremTerm - Res (5-term)

DLC & MDF TERMINATION

48	Fiber Size
66.66%	Percent Non-integrated DLC
63.00%	Percent Copper Feeder
37.00%	Percent Fiber Feeder

PREMISES TERMINATION

100.00%	Percent Residential Premises Termination
0.00%	Percent Business Premises Termination
17.00%	Percent Aerial Premises Termination
83.00%	Percent Buried Premises Termination

SAMPLE DATA

848	Avg. Feeder Stub Length of sample
8db Copper Feeder - State.xls	Copper Feeder sample File
2380000	Copper Feeder sample Qty
8db Fiber Feeder - State.xls	Fiber Feeder sample File
1300000	Fiber Feeder sample Qty
8db Distribution - State.xls	Distribution sample File
3680000	Distribution sample Qty

NETWORK CHARACTERISTICS

12000	Crossover Length		
3	FDI connections		
900	Ohms for Copper Feeder		
900	Ohms for Distribution		
75.00%	Percent Fiber Underground	5.00%	Percent Fiber Aerial
20.00%	Percent Fiber Buried		

POLE

	Use Pole Factor?
Y	If Y, then:
23.00%	Pole Factor
	else:
	Percent Pole utilization
	Percent Leased Poles
	Percent Shared Poles

CONDUIT

	Use Conduit Factor?
Y	If Y, then:
66.00%	Conduit Factor
	else:
	Percent Conduit utilization
	Percent Shared Conduit

General

- *Loop type* defines the type of loop being studied; e.g., 2-wire 8dB or BRI.
- *State* refers to the state or jurisdiction that is being studied.
- *Study area* is often referred to as zones (see footnote 3). The study area can also be the whole state or perhaps some other defined region.
- *Study* names describe the state, loop type, study area, and year. For example, MOxDSL2wZ1 2001 describes a Missouri 2-wire xDSL study done during the year 2001 for zone number 1.
- *Planning period* identifies the time frame that the study uses. Unless otherwise noted, the planning period is four years.

Percent Utilization (Fill Factors)

- *DLC fill* accounts for unused digital loop carrier equipment and is applied in the Digital Loop Carrier System sheet.
- *Distribution fill* is used in the Copper Cable Unit Investment sheets to account for spare copper cable capacity in the distribution.
- *Copper feeder fill* is use in the Copper Cable Unit Investment sheets to account for the spare copper cable capacity in the feeder.
- *Feeder Stub fill* is used in the Feeder Stub Investment development to account for spare feeder stub.
- *Fiber fill* is used in the Fiber Unit Investment sheet to account for spare fiber capacity.

DLC and MDF Termination

- *Fiber Size* used can be 24, 48, 216 fibers per cable. The fiber size is generally determined by the study area.
- *Percent non-integrated DLC*, when applicable, is used to determine the ratio of those loops that utilize a DLC termination verses loops that use conventional frames termination.
- *Percent Copper Feeder* represents the percent of the feeder that is copper and is taken forward to the Expanded Summary to identify the percent occurrence that copper feeder occurs in an average loop.
- *Percent Fiber Feeder* represents the percent of the feeder that is fiber and is also taken forward to the Expanded Summary to identify the percent occurrence that fiber feeder occurs in an average loop.

Premise Termination

- *Percent Residential Premise Termination* represents the percent of the customers that are residential. Residential premise termination consists of different equipment then business termination.
- *Percent Business Premise Termination* represents the percent of the customers that are business. Business premise termination consists of different equipment then residential termination.
- *Percent Aerial Premise Termination* is the percentage of aerial cable that feeds the premise termination.

- *Percent Buried Premise Termination* is the percentage of buried cable that feeds the premise termination.

Sample Data

- *Avg. Feeder Stub Length* is the average of the feeder stub lengths taken from a sample of fiber feeder cable. The average is used in the Expanded Summary as the quantity of feeder stubs.
- *Samples files* identify the Microsoft Excel file that contains the various cable samples that are extracted from the LEIS database. Copper and fiber feeder and distribution each have their own files that SLCS pulls data from. These files help develop the average loop lengths.
- *Sample Quantity* identifies the number of loops in a sample.

Network Characteristics

- *Crossover length*[6] is used in conjunction with the loop sample for determining average loop lengths of fiber feeder and copper feeder.
- *FDI connections* identify the total quantity of feeder and distribution connections. Typically, SLCS assumes one feeder pair going in and two distribution pairs going out giving a total of three FDI connections.
- *Ohms for copper feeder* describes the resistance or ohms of the loop design limit. The design limit can either be 900 or 1500 ohms.
- *Ohms for distribution* is also the resistance associated with the loop design.
- *Percent fiber underground* is the percent of the fiber in the study that is underground. This percentage is used as the fiber cable mix for a given study. Percent fiber underground, buried and aerial summed equals 100%.
- *Percent fiber buried* is the percent of the fiber in the study that is buried. This percentage is used as the fiber cable mix for a given study. Percent fiber underground, buried and aerial summed equals 100%.
- *Percent Fiber Aerial* is the percent of the fiber in the study that is aerial. This percentage is used as the fiber cable mix for a given study. Percent fiber underground, buried and aerial summed equals 100%.

Pole Input

- *Pole Factor* indicates if the cost study is to include a pole factor (Y for yes it is included and N for no it is not included). When a pole factor is used in a study, the pole factor value is populated and represents a current ratio of pole investment to aerial cable investment.

Conduit Input

- *Conduit Input* indicates if the cost study is to include a conduit factor (Y for yes it is included and N for no it is not included). When a conduit factor is used in a study, the conduit factor value is populated and represents a current ratio of conduit investment to underground cable investment.

[6] When the feeder cable length exceeds a certain crossover point or threshold, fiber cable and digital loop carrier system is are assumed in the total loop length as the most efficient loop design.

3.1.2 Yearly Inputs

Labor Rates

These are the labor rates charged by independent contractors for placing drop wire. They are also the SBC Group 1 Craft rates used to calculate the placement of the Frame Stringer assemblies. See appendix A for a more detail description of how labor rates are developed.

Premises Termination

The data listed in this block pertains to the material unit costs and the times necessary for placing the Premises Termination components.

Frame Stringer for Copper and DLC

This information pertains to the material costs associated with the frame stringer assembly. Also included are the labor hours necessary for placing the protector block and riser cable.

Fiber Cable

This section contains the broadgauge costs associated with underground and buried cable. Broadgauge costs come from a state specific Broadgauge Unit Investment Binder[7]. The costs are displayed by fiber size and are used in the development of the fiber cable investments.

FDI Quantity

This section lists the number of the various sizes of Feeder Distribution Interfaces (FDI) that are in service. This data is used to calculate the percent of occurrence of each FDI size and to estimate the quantity and sizes of placed feeder cable. This information is obtained from company inventory databases.

FDI Cost

This section lists the investment of each type of FDI used by SBC. These investments are obtained from the state specific Broadgauge Unit Investment Binder.

Business Premises Terminal Fill Rates

This section lists the optimal utilization for a business premises terminal.

Business Premises Terminal

This section lists the investments for business premises terminals by block size. These cost are obtained from the state specific Broadgauge Unit Investment Binder.

Business Premises Terminal Lines in Service

This is the number of business premises terminal lines in service for each block size.

[7] BroadGauge Unit Investment Binder is an engineering estimating tool that contains material costs that are taken from purchase invoices. Throughout this document when "broadgauge" or "broadgauge costs," are mentioned, it is referring to this binder.

Building Cable

This section lists the investment of building cable by cable size. These investments are obtained from the state specific Broadgauge Unit Investment Binder.

DLC - Remote Terminal Common -

This block contains the material investments and their quanities by part type and number, for provisioning one DLC system.

DLC - RT Channel Units

This block contains the material investments, by part type and number, for the plug in circuit cards. These cards, depending on the service type being studied, are plugged into the DLC.

DLC - Central Office Terminal Common

This block contains the material investments and their quantities, by part type and number, that are necessary to equip a central office terminal (COT) with a digital loop carrier.

DLC - COT Channel Units

This block contains the material investments, by part type and number, for the plug in circuit cards. These cards, depending on the service type being studied, are plugged into the DLC.

Miscellaneous

This section includes Sales Tax, the Power Factor and the Building Factor. These factors are applied against equipment investment when the cost associated with each factor is considered a direct cost and when it is appropriate for application. Sales Tax, when applied, adds to the investment the appropriate state specific sales tax, when the investment input does not already include sales tax. The Power and Building Factors are applied when the investment being studied is located in a SBC-owned building, uses power and occupies building space. A separate building factor is identified to account for buildings associated with DLC equipment and building associated with frame equipment. Innerduct[8] cost per foot adders are included when figuring buried and underground cable investments.

The Engineered, Furnished & Installed (E, F&I) percentages are used to determine the cost associated with installing 257C and 357C circuit equipment. The factors are provided by the PICS/DCPR organization and are a ratio of total in-placed equipment investment over total equipment material investment.

[8] Innerduct is a nonmetallic raceway that loosely holds telephone cable and is similar to conduit but is typically larger.

Cost Factors

This section includes the annual cost factors, by account code, used to calculate the annual recurring cost associated with each component of the loop. The loop costing system applies the individual factors against the appropriate investment for the particular account code. See appendix A for a more detail description of how labor rates are developed.

Inflation Factors

This section includes the factors necessary to inflate and levelize the cost over the proposed planning period of the study. Generally, SLCS studies are developed using a four year time period, meaning levelization is an average over the four year period.

Copper Cable Costs

This section contains the broadgauge costs associated with aerial, buried and underground cable. The costs are displayed by cable size and gauge and are used in the development of the copper cable investments for the copper-based facilities. The cable investments are taken from the latest available state specific Broadgauge Unit Investment Binder.

Copper Cable Lengths (Feeder + Distribution)

This section represents the total copper sheath feet of feeder cable plus distribution cable by cable size, gauge and type. This data is used to calculate the weightings for each cable size by type and construction type for distribution cable. This information is obtained from company inventory databases.

3.2 SLCS Cost Output

SLCS brings forward all of the unit investments to the Expanded Summary worksheet where it applies unit quantity, percent occurrence and annual cost factors. These results are then divided by 12 to derive a monthly cost. Finally, the loop component costs are summarized at the bottom of the worksheet.

The following sections describe of the individual loop component calculations associated with the Expanded Summary. Annual factors are identified in the Annual Cost Factor worksheet of the cost system and described in detail in Appendix A. Unless otherwise stated, material costs are taken from broadgauge.

3.2.1 Premises Termination – Expanded Summary

Premises termination consists of the network interface device (NID) or building terminal, a drop cable and terminal (located near the customer's premises).

Aerial Service Wire: Unit Investments for this component, identified per pair under account 622C, are brought forward from the premises termination investment worksheets. The unit investment is multiplied by the quantity required and the percent occurrence rate. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to obtain a monthly cost.

Buried Service Wire: The steps for these calculations are the same as those for the Single/Multi Line Aerial Service Wire termination. However, for buried service wire termination, account 645C information is applied.

Building Entrance Facility: The steps for these calculations are the same as those for the Single/Multi Line Aerial Service Wire termination. However, for building entrance facility termination, account 12C information is applied.

Figure 8 – Premises Termination - Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Premises Termination								
Residential								
Aerial	22C	Pair	$119.7832	1	11.05%	$13.2368	0.2632	$0.2903
Buried	645C	Pair	$181.1201	1	53.95%	$97.7143	0.2565	$2.0886
Business								
Aerial	22C	Pair	$36.2888	1	5.95%	$2.0397	0.2632	$0.0447
Buried	645C	Pair	$49.4668	1	29.05%	$14.3699	0.2565	$0.3072
Building Entrance Facility	12C	Pair	$0.8667	1	35.00%	$0.3033	0.2252	$0.0057
Subtotal						$127.6632		$2.7365

3.2.2 Distribution Cable – Expanded Summary

Distribution cable is the copper cable that runs from the feeder distribution interface to the terminal located near the customer's premises.

Copper: Unit investments in copper cable, including accounts in aerial (22C), buried (45C) and underground (5C) for the four common gauges, 19, 22, 24 and 26, are calculated on a pair-foot unit basis and brought forward to the expanded summary from the Cable Unit Investment worksheets (Average Unit Investment). The pair-foot unit investment is multiplied by the average total pair-feet of distribution cable from the Copper Distribution Lengths worksheet and then multiplied by the percent occurrence of copper cable in the distribution. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to result in a monthly cost. These calculations are made for each account and gauge.

Figure 9 – Distribution Cable – Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Distribution								
Copper								
Aerial Cable	22C							
26 Gauge		Pair-Feet	$0.5329	301	100.00%	$160.1329	0.2632	$3.5122
24 Gauge		Pair-Feet	$0.5884	6	100.00%	$3.5304	0.2632	$0.0774
22 Gauge		Pair-Feet	$0.7832	3	100.00%	$2.1096	0.2632	$0.0463
19 Gauge		Pair-Feet	$0.8757	0	100.00%	$0.0000	0.2632	$0.0000
Buried Cable	45C							
26 Gauge		Pair-Feet	$0.1700	639	100.00%	$108.6300	0.2565	$2.3220
24 Gauge		Pair-Feet	$0.1691	13	100.00%	$2.1983	0.2565	$0.0470
22 Gauge		Pair-Feet	$0.2309	7	100.00%	$1.6163	0.2565	$0.0345
19 Gauge		Pair-Feet	$0.4334	1	100.00%	$0.4334	0.2565	$0.0093
U.G.Cable	5C							
26 Gauge		Pair-Feet	$0.0398	432	100.00%	$17.1936	0.2349	$0.3366
24 Gauge		Pair-Feet	$0.0393	8	100.00%	$0.3144	0.2349	$0.0062
22 Gauge		Pair-Feet	$0.0480	5	100.00%	$0.2400	0.2349	$0.0047
19 Gauge		Pair-Feet	$0.0000	1	100.00%	$0.0000	0.2349	$0.0016
Poles	1C	Factor	-	-	-	$38.1276	0.2143	$0.6809
Conduit	4C	Factor	-	-	-	$11.7665	0.1831	$0.1795
Subtotal						$346.3721		$7.2582

Poles and Conduit: Typically, separate pole and conduit studies are conducted wherein factors are developed using company accounting records. Within these studies, recent annual pole (or conduit) expenses that have been incurred by the company relative to the annual aerial (or underground) cable expenses are determined. This ratio comprises the pole and conduit factors.

3.2.3 Feeder Distribution Interface (FDI) - Expanded Summary

The feeder distribution interface is the "cross-connection" terminal connecting the feeder plant (described later) from the serving central office to the distribution cable just described.

The number of FDIs in service is determined from company Loop Engineering Information System (LEIS) data. LEIS is a company database that provides an inventory of loop plant.

Feeder Distribution Interface: The unit investment for the Feeder Distribution Interface, account 45C, is brought forward from the FDI worksheet to the expanded summary worksheet and is provided on a per-connection unit basis. The unit investment is multiplied first by a quantity of 3 (6 for 4-wire) representing the number of incoming and outgoing terminations required for the loop and secondly by the percentage of FDIs that are required (percent occurrence). This resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Figure 10 – Feeder Distribution Interface (FDI) – Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Feeder Distribution Interface	45C	Connection	$5.7150	3	100.00%	$17.1450	0.2565	$0.3665

3.2.4 Feeder - Expanded Summary

The feeder cable is the portion of the loop that runs from the serving central office to the feeder-distribution interface. Feeder plant can be comprised of either copper or fiber cables. If comprised of fiber cable, digital loop carrier (DLC) systems are used. (These DLC systems are also called Pair Gain systems.) Within the study, DLC/fiber system costs are determined separately from the copper-only feeder system costs, and the results of each are blended according to their forward-looking weighting, for the final results.

Copper Cable (Aerial, Buried and Underground): Copper cable unit investments, including accounts for aerial (22C), buried (45C) and underground (5C), for the four common gauges, 19, 22, 24 and 26, are calculated on a pair-foot unit basis in the Cable Unit Investment worksheets (Average Unit Investment). This unit investment for the cable is multiplied by the quantity from the Copper Feeder Length worksheet and then multiplied by the percent occurrence (versus fiber). The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to compute the monthly cost. Similar calculations are made for each type and gauge of feeder cable.

The copper cable material costs are taken from the Broadgauge. Broadgauge is an engineering estimating tool that contains material costs that are taken from purchase invoices.

Poles and Conduit: Same as previously mentioned above.

Digital Loop Carrier System: For these studies, when loop feeder cable lengths exceed a certain threshold, a DLC system with fiber feeder cable is assumed to be used as the forward-looking loop design. The DLC pair gain system requires circuit equipment located in the field, referred to as remote terminal (RT) equipment, and in the central office, referred to as central office terminal (COT) equipment. Depending on the study, a mix of universal and integrated DLCs may be assumed.

C.O. Terminal Equipment: Unit investment for central office terminal equipment, account 257C, is calculated on a per DS0 unit basis in the Digital Loop Carrier System worksheets. This unit investment is multiplied by the quantity of DS0s consumed for the loop service, and then multiplied by a percent occurrence, which represents the percentage of loops that are assumed to be using DLC. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Remote Terminal Equipment: Unit investment for remote terminal equipment, account 257C, is calculated on a per DS0 unit basis in the Digital Loop Carrier System worksheets. This unit investment is multiplied by the quantity of DS0s consumed for the loop service, and then multiplied by a percent occurrence, which represents the percentage of loops that are assumed to be using DLC. The resulting Investment per loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Power Equipment: Investment per loop for power, account 257C, is determined through the use of a power equipment factor. The factor is multiplied by the sum of account 257C equipment Investments per Loop identified in the previously described DLC equipment categories. The resulting investment per loop is multiplied by the annual cost factor for equipment and divided by 12 to calculate the monthly cost.

Building: Investment per loop for building equipment, account 10C, is determined through the use of a building factor. The factor is multiplied by the sum of account 257C equipment Investments per Loop identified in the previously described DLC equipment categories. The resulting investment per loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Land: Investment per loop for land, account 11C, is determined through the use of a land factor. The factor is multiplied by the sum of account 257C equipment Investments per loop identified in the previously described DLC equipment

categories. The resulting investment per loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Fiber Cable: Unit investments for underground and buried fiber cable, accounts 85C and 845C, respectively, are calculated on a fiber-foot unit basis in the Fiber Unit Investment worksheet. This unit investment is multiplied by the quantity consumed and then multiplied by the percent occurrence, which represents a ratio of the amount of fiber to the total cable for the loop feeder. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Poles and Conduit: Same as previously mentioned above.

Figure 11 – Feeder – Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Feeder								
Copper Cable								
Aerial Cable	22C							
26 Gauge		Pair-Feet	$0.1011	165	63.00%	$10.5893	0.2632	$0.2305
24 Gauge		Pair-Feet	$0.1020	1	63.00%	$0.0643	0.2632	$0.0014
22 Gauge		Pair-Feet	$0.1188	0	63.00%	$0.0000	0.2632	$0.0000
19 Gauge		Pair-Feet	$0.1692	0	63.00%	$0.0000	0.2632	$0.0000
Buried Cable	45C							
26 Gauge		Pair-Feet	$0.0297	712	63.00%	$13.3222	0.2565	$0.2849
24 Gauge		Pair-Feet	$0.0326	5	63.00%	$0.1027	0.2565	$0.0022
22 Gauge		Pair-Feet	$0.0428	0	63.00%	$0.0000	0.2565	$0.0000
19 Gauge		Pair-Feet	$0.0525	0	63.00%	$0.0000	0.2565	$0.0000
U.G Cable	5C							
26 Gauge		Pair-Feet	$0.0158	4,825	63.00%	$48.0201	0.2349	$0.9402
24 Gauge		Pair-Feet	$0.0202	37	63.00%	$0.4709	0.2349	$0.0092
22 Gauge		Pair-Feet	$0.0282	0	63.00%	$0.0000	0.2349	$0.0000
19 Gauge		Pair-Feet	$0.0349	0	63.00%	$0.0000	0.2349	$0.0000
Poles	1C	Factor	-	-	-	$2.4319	0.2143	$0.0434
Conduit	4C	Factor	-	-	-	$32.0893	0.1031	$0.4084
Pair Gain								
Feeder Stub	45C	Pair-Feet	$0.0424	848	37.00%	$13.3034	0.2565	$0.2844
Digital Loop Carrier								
C.O. Terminating Equipment	257C	Channel	$114.1590	1	37.00%	$42.2388	0.2530	$0.0985
Remote Terminating Equipment	257C	Channel	$318.1298	1	37.00%	$117.7080	0.2530	$2.4817
Power Equipment	257C	Factor	-	-	-	$7.70	0.2530	$0.1623
Building	10C	Factor	-	-	-	$59.31	0.1916	$0.9478
Land	11C	Factor	-	-	-	$0.73	0.1861	$0.0113
Fiber Cable								
U.G. Cable	85C	Fiber-Feet	$0.0005	11,589	37.00%	$2.1448	0.2804	$0.0358
Buried Cable	845C	Fiber-Feet	$0.0009	3,090	37.00%	$1.0290	0.2837	$0.0175
Aerial Cable	822C	Fiber-Feet	$0.0005	773	37.00%	$0.1430	0.1974	$0.0024
Pole	1C	Factor	-	-	-	$0.0329	0.2143	$0.0006
Conduit	4C	Factor	-	-	-	$1.4158	0.1031	$0.0216
Subtotal						*$352.6928*		*$6.0552*

3.2.7 Main Distribution Frame - Expanded Summary

Frame Stringer connects outside plant cables to the Main Distribution Frame. It includes a protector unit, protector block, riser cable and the labor cost to place the equipment. This equipment protects personnel and sensitive electronic equipment from external electrical power.

Copper Cable Termination: Unit investment for the frame associated copper cable, account 377C, is calculated on a per pair unit basis in the Frame Stringer (MDF) Copper worksheet of the cost tool. This unit investment is multiplied by the quantity consumed, then multiplied by the percent occurrence, which represents the percentage of non-DLC

loops. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

DLC Termination: Unit investment for frame related DLC terminations, account 377C, is calculated on a per DS0 (channel) basis in the Frame Stringer (MDF) DLC worksheet of the cost tool. This unit investment is multiplied by the quantity consumed for the loop and then multiplied by a percent occurrence, which represents the percentage of lines requiring a central office terminal termination. The resulting Investment per Loop is multiplied by the annual cost factor and divided by 12 to calculate the monthly cost.

Building Equipment: Same as previously mentioned above.

Land: Same as previously mentioned above.

Figure 12 – Main Distribution Frame – Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Main Distribution Frame								
Copper Cable Termination	377C	Pair	$19.0000	1	63.00%	$11.9700	0.2685	$0.2678
DLC Termination	377C	Pair	$4.0161	1	24.66%	$0.9904	0.2685	$0.0222
Building	10C	Factor	-	-	-	$4.5850	0.1916	$0.0732
Land	11C	Factor	-	-	-	$0.0562	0.1861	$0.0009
Subtotal						*$17.6016*		*$0.3641*

4.0 Detailed Description of SLCS Methodology

Section 4 describes in greater detail the calculations that are used in the unit investment worksheets. Many of the calculations performed by the unit investment worksheets utilize data from the sample and input worksheets as diagramed in Figure 1.

4.1 Premises Termination Investment Worksheets

For Premises Termination – Residence, the unit investment is calculated as follows: the unit cost (from broadgauge) is multiplied by the quantity, divided by the capacity, and then divided by the fill factor to arrive at a unit investment.

The residential premises termination fill factor is determined by obtaining the number of working telephone lines per residence from company billing databases. This number divided by the premises termination capacity comprises the residential premises termination fill factor.

Figure 13 – Premises Termination - Residential

Premises Termination - Residential

Single Line - Aerial (Six Pair Service Wire)

Item	Acc't	Units	Unit Cost	Qty	Capacity	Fill Factor	Unit Investment
Service Wire (Aerial Cable - Copper)	622C	Feet	$0.4000	194	6	18.45%	$70.0994
Wire Apparatus / Wire Protector	622C	Unit	$55.0000	1	6	18.45%	$49.6838
Total							$119.7832

Single Line - Buried (Five Pair Service Wire)

Item	Acc't	Units	Unit Cost	Qty	Capacity	Fill Factor	Unit Investment
Trenching by Contractor	645C	Feet	$0.5000	194	5	22.14%	$87.6242
Service Wire (Buried Cable - Copper)	645C	Feet	$0.2500	194	5	22.14%	$43.8121
Wire Apparatus / Wire Protector	645C	Unit	$55.0000	1	6	18.45%	$49.6838
Total							$181.1201

For Premises Termination – Business, the unit investment calculation is computed in a similar manner to the residential premises termination, but also recognizes the weighting of the different NID or building entrance terminal (BET) capacities that are in service.

These weightings are determined from data obtained from company billing databases. The number of working telephone lines at each business location is acquired from the billing data. An optimally sized BET is assumed for each location. The individual line count, and proportionate weighting with relation to the total working line count, of all of the BETs, of all sizes, is determined by the study area.

The business premises termination fill factor is determined by dividing the number of working lines in the zone by the number of available lines.

Figure 14 – Premises Termination - Business

Premises Termination - Business

Multi Line - Buried (Five Pair Service Wire)

Item	Acc't	Units	Unit Cost	Qty	Pair Capacity	Fill Factor	Lines In-Service	Percent of Total	Unit Investment
Trenching by Contractor	645C	Feet	$0.5000	194	5	40.82%		45.64%	$21.6907
Service Wire (Buried Cable - Copper)	645C	Feet	$0.2500	194	5	40.82%		45.64%	$10.8454
Wire Apparatus / Wire Protector (6pr capacity)	645C	Unit	$55.0000	1	6	34.02%	936,000	45.64%	$12.2977
Wire Apparatus / Wire Protector (25pr capacity)	12C	Unit	$150.0000	1	25	46.58%	608,000	29.64%	$3.8179
Wire Apparatus / Wire Protector (50pr capacity)	12C	Unit	$200.0000	1	50	68.72%	113,000	5.51%	$0.3207
Wire Apparatus / Wire Protector (100pr capacity)	12C	Unit	$300.0000	1	100	68.08%	128,000	6.24%	$0.2750
Wire Apparatus / Wire Protector (200pr capacity)	12C	Unit	$340.0000	1	200	68.84%	73,000	3.56%	$0.0879
Wire Apparatus / Wire Protector (300pr capacity)	12C	Unit	$413.0000	1	300	81.59%	40,000	1.95%	$0.0329
Wire Apparatus / Wire Protector (400pr capacity)	12C	Unit	$479.0000	1	400	85.69%	34,000	1.66%	$0.0232
Wire Apparatus / Wire Protector (600pr capacity)	12C	Unit	$678.0000	1	600	82.16%	53,000	2.58%	$0.0355
Wire Apparatus / Wire Protector (900pr capacity)	12C	Unit	$877.0000	1	900	80.33%	66,000	3.22%	$0.0391
Total							2,051,000		$49.4660

Multi Line - Aerial (Six Pair Service Wire)

Item	Acc't	Units	Unit Cost	Qty	Pair Capacity	Fill Factor	Lines In-Service	Percent of Total	Unit Investment
Service Wire (Aerial Cable - Copper)	622C	Feet	$0.4000	194	6	34.02%		45.64%	$17.3509
Wire Apparatus / Wire Protector (6pr capacity)	622C	Unit	$55.0000	1	6	34.02%	936,000	45.64%	$12.2977
Wire Apparatus / Wire Protector (25pr capacity)	12C	Unit	$150.0000	1	25	46.58%	608,000	29.64%	$3.8179
Wire Apparatus / Wire Protector (50pr capacity)	12C	Unit	$200.0000	1	50	68.72%	113,000	5.51%	$0.3207
Wire Apparatus / Wire Protector (100pr capacity)	12C	Unit	$300.0000	1	100	68.08%	128,000	6.24%	$0.2750
Wire Apparatus / Wire Protector (200pr capacity)	12C	Unit	$340.0000	1	200	68.84%	73,000	3.56%	$0.0879
Wire Apparatus / Wire Protector (300pr capacity)	12C	Unit	$413.0000	1	300	81.59%	40,000	1.95%	$0.0329
Wire Apparatus / Wire Protector (400pr capacity)	12C	Unit	$479.0000	1	400	85.69%	34,000	1.66%	$0.0232
Wire Apparatus / Wire Protector (600pr capacity)	12C	Unit	$678.0000	1	600	82.16%	53,000	2.58%	$0.0355
Wire Apparatus / Wire Protector (900pr capacity)	12C	Unit	$877.0000	1	900	80.33%	66,000	3.22%	$0.0391
Total							2,051,000		$34.2808

Building Entrance Facility

Item	Acc't	Units	Unit Cost	Qty	Pair Capacity	Fill Factor	Percent of Total	Unit Investment
Building Wire (25pr capacity)	12C	Feet	$3.0000	10	25	46.58%	29.64%	$0.7636
Building Wire (50pr capacity)	12C	Feet	$2.9000	10	50	68.72%	5.51%	$0.0465
Building Wire (100pr capacity)	12C	Feet	$3.5000	10	100	68.08%	6.24%	$0.0321
Building Wire (200pr capacity)	12C	Feet	$4.0000	10	200	68.84%	3.56%	$0.0103
Building Wire (300pr capacity)	12C	Feet	$4.5000	10	300	81.59%	1.95%	$0.0036
Building Wire (400pr capacity)	12C	Feet	$5.0000	10	400	85.69%	1.66%	$0.0024
Building Wire (600pr capacity)	12C	Feet	$7.0000	10	600	82.16%	2.58%	$0.0037
Building Wire (900pr capacity)	12C	Feet	$10.0000	10	900	80.33%	3.22%	$0.0045
Total								$0.8667

The ratio of residential lines or business lines to the total number of lines determines the percent residential premises termination, and the percent business premises termination weightings, respectively.

4.2 Copper Cable Unit Investment Worksheets

The cable unit investment calculations develop the average unit investments for feeder and distribution (average unit investments table, average costs per pair foot column). These costs are developed separately for feeder and distribution since feeder cables tend to be larger, less expensive on a per unit basis, and serve more lines than distribution cables. The average cost per pair foot is calculated in a three-step process described below (Figure 15):

Feeder Cable Table:

The installed cost per foot is computed by adding the cable cost per foot from broadgauge to the contractor installation cost per foot. This amount is then divided by the appropriate cable size, resulting in the installed cost per pair foot. Next, the sheath feet in service is multiplied by a predetermined percentage to allocate cable inventory to feeder cable. This predetermined percentage is based on the characteristics of the typical design of outside plant. This results in feeder sheath feet which is then multiplied by the cable size (pairs) to compute feeder pair feet in service. Each cable size is then weighted according to feeder pair feet

in service and multiplied by the installed cost per pair foot, resulting in a weighted installed cost per pair foot.

Distribution Cable Table:
The installed cost per foot is computed by adding the cable cost per foot from broadgauge to the contract installation cost per foot. This amount is then divided by the appropriate cable size, resulting in the installed cost per pair foot. Next, the sheath feet in service is multiplied by a predetermined percentage to allocate cable inventory to distribution cable. This predetermined percentage is based on the characteristics of the typical design of outside plant. This results in distribution sheath feet, which is then multiplied by the cable size (pairs) to compute distribution pair feet in service. Each cable size is then weighted according to distribution pair feet in service and multiplied by the installed cost per pair foot, resulting in a weighted installed cost per pair foot.

Figure 15 - Feed and Distribution Cable Investment

Copper Cable Unit Investment - Underground 19 Gauge

Feeder Cable

Cable Size (Pairs)	Broad Gauge Cost / Foot	Contract Installation Cost / Foot	Installed Cost / Foot	Installed Cost/Pair Foot	Sheath Feet in Service	Feeder Percentage of Sheath by Cable Size	Feeder Sheath Feet	Feeder Pair Feet in Service	Percent of Total	Weighted Installed Cost/Pair Foot
25	$2.0000	$5.0000	$7.0000	$0.2800	65,489	0%	0	0	0.00%	$0.0000
50	$3.0000	$5.0000	$8.0000	$0.1600	103,781	0%	0	0	0.00%	$0.0000
100	$4.0000	$5.0000	$9.0000	$0.0900	174,160	0%	0	0	0.00%	$0.0000
200	$6.0000	$5.0000	$11.0000	$0.0550	135,422	0%	0	0	0.00%	$0.0000
300	$8.0000	$5.0000	$13.0000	$0.0433	624,173	10%	62,417	16,725,100	5.80%	$0.0025
400	$8.0000	$5.0000	$13.0000	$0.0325	58,453	20%	11,691	4,676,400	1.45%	$0.0005
600	$8.0000	$5.0000	$13.0000	$0.0217	966,145	50%	483,073	289,843,800	89.79%	$0.0195
900	$8.0000	$5.0000	$13.0000	$0.0144	0	60%	0	0	0.00%	$0.0000
1,200	$8.0000	$5.0000	$13.0000	$0.0108	0	80%	0	0	0.00%	$0.0000
1,500	$8.0000	$5.0000	$13.0000	$0.0087	0	90%	0	0	0.00%	$0.0000
1,800	$8.0000	$5.0000	$13.0000	$0.0072	0	100%	0	0	0.00%	$0.0000
2,100	$8.0000	$5.0000	$13.0000	$0.0062	4,543	100%	4,543	9,540,300	2.95%	$0.0062
2,400	$8.0000	$5.0000	$13.0000	$0.0054	0	100%	0	0	0.00%	$0.0000
2,700	$8.0000	$5.0000	$13.0000	$0.0048	0	100%	0	0	0.00%	$0.0000
3,000	$8.0000	$5.0000	$13.0000	$0.0043	0	100%	0	0	0.00%	$0.0000
3,600	$8.0000	$5.0000	$13.0000	$0.0036	0	100%	0	0	0.00%	$0.0000
4,200	$8.0000	$5.0000	$13.0000	$0.0031	0	100%	0	0	0.00%	$0.0000
Total					2,132,166		561,724	322,785,600	100%	$0.0227

Distribution Cable

Cable Size (Pairs)	Broad Gauge Cost / Foot	Contract Installation Cost / Foot	Installed Cost / Foot	Installed Cost/Pair Foot	Sheath Feet in Service	Distribution Percentage of Sheath by Cable Size	Distribution Sheath Feet	Distribution Pair Feet in Service	Percent of Total	Weighted Installed Cost/Pair Foot
25	$2.0000	$5.0000	$7.0000	$0.2800	65,489	100%	65,489	1,637,225	0.31%	$0.0009
50	$3.0000	$5.0000	$8.0000	$0.1600	103,781	100%	103,781	5,189,050	0.98%	$0.0016
100	$4.0000	$5.0000	$9.0000	$0.0900	174,160	100%	174,160	17,416,000	3.30%	$0.0030
200	$6.0000	$5.0000	$11.0000	$0.0550	135,422	100%	135,422	27,084,400	5.13%	$0.0028
300	$8.0000	$5.0000	$13.0000	$0.0433	624,173	90%	561,756	168,526,800	31.89%	$0.0138
400	$8.0000	$5.0000	$13.0000	$0.0325	58,453	80%	46,762	18,704,800	3.54%	$0.0012
600	$8.0000	$5.0000	$13.0000	$0.0217	966,145	50%	483,073	289,843,800	54.85%	$0.0119
900	$8.0000	$5.0000	$13.0000	$0.0144	0	40%	0	0	0.00%	$0.0000
1,200	$8.0000	$5.0000	$13.0000	$0.0108	0	20%	0	0	0.00%	$0.0000
1,500	$8.0000	$5.0000	$13.0000	$0.0087	0	10%	0	0	0.00%	$0.0000
1,800	$8.0000	$5.0000	$13.0000	$0.0072	0	0%	0	0	0.00%	$0.0000
2,100	$8.0000	$5.0000	$13.0000	$0.0062	4,543	0%	0	0	0.00%	$0.0000
2,400	$8.0000	$5.0000	$13.0000	$0.0054	0	0%	0	0	0.00%	$0.0000
2,700	$8.0000	$5.0000	$13.0000	$0.0048	0	0%	0	0	0.00%	$0.0000
3,000	$8.0000	$5.0000	$13.0000	$0.0043	0	0%	0	0	0.00%	$0.0000
3,600	$8.0000	$5.0000	$13.0000	$0.0036	0	0%	0	0	0.00%	$0.0000
4,200	$8.0000	$5.0000	$13.0000	$0.0031	0	0%	0	0	0.00%	$0.0000
Total					2,132,166		1,570,443	529,402,075	100%	$0.0352

Average Unit Investments

Item	Installed Cost/Pair Foot	Percent Utilization	Average Cost/Pair Foot
Feeder Cable	$0.0227	65.00%	$0.0349
Distribution Cable	$0.0352	44.00%	$0.0800

Average Unit Investments (Average Unit Investment Table):
The average unit investments for Feeder and Distribution cables, last column, are obtained by dividing the Installed Cost per Pair Foot just calculated for Feeder and Distribution Cable by the percent utilization (fill factor).

Feeder and Distribution Fill Factors

A mechanized data extraction program, called wcstats, is used to determine the feeder and distribution fill factors. The program runs daily on the company Loop Engineering Information System (LEIS) server. Each day, wcstats scans the data from several wire centers within the LEIS system, and determines the number of working lines and the number of available lines extending from each wire center, in both the feeder and the distribution. Over the course of a month, all of the wire centers in the state are analyzed, and their data stored in the wcstats table. This information is used to determine the feeder and distribution fill factors, by zone. Feeder and distribution fill factors are included in the user input worksheet.

4.2.1 Copper Distribution Lengths Worksheet

After the lengths by gauge are determined for copper distribution, the distribution cable mix is applied. The total feet for aerial, buried and underground is brought forward and applied to the calculations computed on the distribution cable – Expanded Summary worksheet.

Figure 16 – Copper Distribution Lengths

Copper DistributionLengths by Cable Type

Gauge	Total Sample Feet	Aerial		Buried		UnderGround	
		Cable Mix	Total Feet	Cable Mix	Total Feet	Cable Mix	Total Feet
		21.93%		46.61%		31.46%	
19	2		0		1		1
22	15		3		7		5
24	27		6		13		8
26	1,372		301		639		432

4.2.2 Sample Summary

The sample summary provides a representation of the cable gauging that an average subscriber loop in an area would contain. Assuming a forward-looking design, most loops over a certain length would contain a digital loop carrier system and fiber.

The actual lengths of subscriber loops in a study area are obtained by extracting data samples from the company engineering database called LEIS. The samples contain the actual lengths of the feeder and distribution portions of these subscriber loops. The samples are processed so that the feeder portion of the samples is separated into loops that are copper-only and loops that are fiber. This is done by imposing the copper-fiber crossover point onto the samples. When loop lengths are less than this crossover point, copper feeder is placed; when loop lengths are greater or equal to this distance, it is more economical to place fiber feeder.

The samples are then processed within SLCS. Electrical resistance formulas are used to determine the gauge of wire that should be used for each loop based on its corresponding length. The result is an average loop comprised of an mix of copper gauges that provide the specified resistance for the loop of average length.

Averaging the loop sample lengths for the loops with lengths less than the copper-fiber crossover point provides the copper feeder lengths. The length for Fiber Feeder is determined by averaging the feeder lengths for each assumed fiber loop in the sample.

Figure 17 – Sample Summary

Sample Summary

The following numbers are based on a Feeder Copper-Fiber Crossover point of: XXXXXX

Total Sample Feet				
Transmission Medium	Copper Feeder	Fiber Feeder	Copper Distribution	Copper Feeder Stub
19 gauge	0		2	
22 gauge	0		15	
24 gauge	43		27	848
26 gauge	5,702		1,372	
Fiber Size 48		15,452		

4.2.3 Copper Cable Mix Worksheet

The cable mix represents the percentages of aerial, buried and underground cable that are in an "average" loop identified for both the feeder and the distribution. Using the total feeder pair feet for aerial, buried and underground, the three cable types are weighted against their sum to produce a feeder weighting for aerial, buried and underground. This is carried forward to the Copper Feeder Lengths worksheet. Using the total distribution pair feet for aerial, buried and underground, the three cable types are weighted against their sum to produce a distribution weighting for aerial, buried and underground. This is carried forward to the Copper Distribution Lengths worksheet.

Figure 18 – Copper Cable Mix

Copper Cable Mix

	Feeder pair ft.	Feeder Wtg by pair feet	Distribution pair ft.	Dist Wtg by pair feet
Aerial	3,339,255,700	2.90%	13,916,381,450	21.93%
Buried	14,352,245,200	12.48%	29,579,193,425	46.61%
Underground	97,306,498,900	84.62%	19,961,494,925	31.46%

Feeder Pair Ft.	26 Gauge	24 Gauge	22 Gauge	19 Gauge	Total
Aerial	1,905,486,800	1,108,981,900	304,062,200	20,724,800	3,339,255,700
Buried	5,409,424,800	6,553,861,600	2,244,723,900	144,234,900	14,352,245,200
Underground	45,640,783,200	34,362,542,500	16,980,387,600	322,785,600	97,306,498,900

Distribution Pair Ft.	26 Gauge	24 Gauge	22 Gauge	19 Gauge	Total
Aerial	7,451,516,200	4,350,210,350	1,733,660,600	380,994,300	13,916,381,450
Buried	8,796,625,400	11,154,649,050	7,609,918,975	2,018,000,000	29,579,193,425
Underground	4,774,979,275	6,455,518,600	8,202,594,975	528,402,075	19,961,494,925

4.2.4 Annual Cost Factors Worksheet

The Annual Cost Factor consists of the Capital Cost Factor plus the Operating Expense Factor plus Commission Assessment Factor (if applicable). The Capital Cost Factor is the sum of the cost factors for depreciation, cost of money and income tax, followed by the application of the appropriate capital cost inflation factor. The Operating Expense

Factor is the sum of the cost factors for maintenance, support assets and miscellaneous taxes, followed by the application of the appropriate operating expense inflation factor. Many jurisdictions directly charge consumers for the cost of regulation. This assessment is typically an additional fee on each dollar spent by a customer for services. In those states where a fee is charged to consumers, a commission assessment factor is computed.

Figure 19 – Annual Cost Factors

Annual Cost Factors

Capital Cost Factor

Plant	Field Reporting Code	Depreciation Factor	Cost of Money Factor	Income Tax Factor	Ad Valorem Tax Factor	Capital Cost Factor Subtotal	Capital Cost Inflation Factor	Capital Cost Factor w/ Inflation
Polar	1C	0.08333	0.05496	0.03078	0.00790	0.17697	1.06539	0.18854
Aerial Cable	(6)22C	0.08333	0.06453	0.03614	0.00790	0.19190	1.05610	0.20267
DLC Equipment	257C	0.11111	0.05349	0.02996	0.00790	0.20246	0.99215	0.20087
Frame Equipment	377C	0.10000	0.05347	0.02995	0.00790	0.19132	1.02917	0.19690
Buried Cable - Copper	(6)45C	0.07333	0.06842	0.03832	0.00790	0.18797	1.05900	0.19906
Conduit	4C	0.02200	0.07904	0.04427	0.00790	0.15321	1.06282	0.16283
Underground Cable - Copper	5C	0.08333	0.06453	0.03614	0.00790	0.19190	1.05351	0.20217
Buried Cable - Fiber	845C	0.05500	0.06932	0.03883	0.00790	0.17105	1.03544	0.17715
Underground Cable - Fiber	85C	0.06000	0.06701	0.03753	0.00790	0.17244	1.00457	0.17323
Aerial Cable - Fiber	822C	0.06250	0.06585	0.03688	0.00790	0.17313	0.99989	0.17311
Building - DLC	10C	0.02386	0.08904	0.04987	0.00790	0.17067	1.05008	0.17922
Building - Frame Equipment	10C	0.02386	0.08904	0.04987	0.00790	0.17067	1.05008	0.17922
Land	11C	0.00000	0.11420	0.06397	0.00790	0.18607	1.00000	0.18607
Building Cable	12C	0.07667	0.06712	0.03760	0.00790	0.18929	1.05573	0.19984

Operating Expense Factor

Plant	Field Reporting Code	Maintenance Factor	Support Assets Factor	Operating Exp. Factor Subtotal	Capital Cost Inflation Factor	Operating Exp. Inflation Factor	Operating Exp. Factor w/ Inflation
Polar	1C	0.01702	0.00741	0.02443	1.06539	0.98770	0.02571
Aerial Cable	(6)22C	0.05015	0.00741	0.05756	1.05610	0.99578	0.06053
DLC Equipment	257C	0.02570	0.02219	0.04789	0.99215	1.09664	0.05211
Frame Equipment	377C	0.05575	0.01130	0.06705	1.02917	1.03804	0.07163
Buried Cable - Copper	(6)45C	0.04732	0.00741	0.05473	1.05900	0.99168	0.05748
Conduit	4C	0.01164	0.00741	0.01905	1.06282	1.00295	0.02031
Underground Cable - Copper	5C	0.02368	0.00741	0.03109	1.05351	0.99843	0.03278
Buried Cable - Fiber	845C	0.01758	0.00741	0.02499	1.03544	1.02493	0.02653
Underground Cable - Fiber	85C	0.01777	0.00741	0.02518	1.00457	1.07233	0.02712
Aerial Cable - Fiber	822C	0.01497	0.00741	0.02238	1.00457	1.07998	0.02428
Building - DLC	10C	0.01177	0.00000	0.01177	1.05008	1.00121	0.01237
Building - Frame Equipment	10C	0.01177	0.00000	0.01177	1.05008	1.00121	0.01237
Land	11C	0.00000	0.00000	0.00000	1.00000	1.00000	0.00000
Building Cable	12C	0.01669	0.00741	0.02410	1.05573	0.99759	0.02538

Annual Cost Factor

Plant	Field Reporting Code	Capital Cost & Operating Exp. Combined	Commission Assessment Factor	Annual Cost Factor w/ Commission Assessment
Polar	1C	0.21425	0.00000	0.21425
Aerial Cable	(6)22C	0.26320	0.00000	0.26320
DLC Equipment	257C	0.25298	0.00000	0.25298
Frame Equipment	377C	0.26853	0.00000	0.26853
Buried Cable - Copper	(6)45C	0.25654	0.00000	0.25654
Conduit	4C	0.18314	0.00000	0.18314
Underground Cable - Copper	5C	0.23487	0.00000	0.23487
Buried Cable - Fiber	845C	0.20368	0.00000	0.20368
Underground Cable - Fiber	85C	0.20035	0.00000	0.20035
Aerial Cable - Fiber	822C	0.19739	0.00000	0.19739
Building - DLC	10C	0.19159	0.00000	0.19159
Building - Frame Equipment	10C	0.19159	0.00000	0.19159
Land	11C	0.18607	0.00000	0.18607
Building Cable	12C	0.22522	0.00000	0.22522

4.3 Feeder Distribution Interface Investment Worksheet

Total feeder distribution interface (FDI) cost is derived by multiplying the number of FDIs in service by the cost per FDI size. FDI connection capacity is obtained by multiplying the FDI size by the FDIs in service. Total FDI cost is then divided by the FDI connection capacity and multiplied by the weighting of this capacity to the total capacity to arrive at a weighted cost per connection.

The total investment per connection is determined by summing the weighted cost per connection in the last column for each FDI size.

The resulting total investment with utilization is simply the total investment divided by the percent utilization or fill factor.

Figure 20 – Feeder Distribution Interface

Feeder Distribution Interface

FDI Size (Connections)	Broad Gauge Cost Per FDI Size	FDIs in Service	Total FDI Cost	FDI Connection Capacity	Percent of Total	Weighted Cost Per Connection
200	$1,000.0000	803	$803,000.0000	160,600	0.47%	$0.0235
600	$2,000.0000	4,465	$8,930,000.0000	2,679,000	7.87%	$0.2623
900	$3,000.0000	3,055	$9,165,000.0000	2,749,500	8.07%	$0.2690
1,200	$4,000.0000	2,735	$10,940,000.0000	3,282,000	9.64%	$0.3213
1,800	$5,000.0000	3,820	$19,100,000.0000	6,876,000	20.19%	$0.5608
2,700	$7,000.0000	3,817	$26,719,000.0000	10,305,900	30.26%	$0.7845
3,600	$9,000.0000	1,695	$15,255,000.0000	6,102,000	17.92%	$0.4480
4,800	$12,000.0000	396	$4,752,000.0000	1,900,800	5.58%	$0.1395
Total Investment			$95,664,000.0000	34,055,800	100.00%	$2.8089
Percent Utilization						49.15%
Total Investment with Utilization						$5.7150

4.3.1 Copper Feeder Lengths Worksheet

After the lengths by gauge are determined for copper cable (using the sample), the feeder cable mix is applied. The total feet for aerial, buried and underground is brought forward and applied to the calculations computed on the Feeder Cable – Expanded Summary worksheet.

Figure 21 – Copper Feeder Lengths

Copper Feeder Lengths by Cable Type

Gauge	Total Sample Feet	Aerial		Buried		UnderGround	
		Cable Mix	Total Feet	Cable Mix	Total Feet	Cable Mix	Total Feet
		2.90%		12.48%		84.62%	
19	0		0		0		0
22	0		0		0		0
24	43		1		5		37
26	5,702		165		712		4,825

4.4 Feeder Stub Unit Investment Worksheet

The Feeder Stub (FS) is a copper cable that originates at the Digital Loop Carrier remote terminal or cabinet and terminates on the feeder side of a Feeder Distribution Interface (FDI). This cable is the transmission pathway for the derived pairs from the DLC. The Feeder Stub is not utilized 100% of the time; there are instances when the FDI is located in the DLC remote terminal.

To calculate the unit investment per foot per pair, unit cost per foot per pair for the average 26 gauge copper cable (account 45C) placed is divided by the fill factor.

Figure 22 – Feeder Stub

Feeder Stub

Item	Acc't	Units	Unit Cost	Fill Factor	Unit Investment
Buried Cable - Copper	45C	Feet	$0.0212	50.00%	$0.0424

4.5 Digital Loop Carrier Worksheet (Remote Terminal – Central Office Terminal)

The DLC section reflects the use of Litespan-2000 from Alcatel as the digital loop carrier. The Litespan-2000 system has become the company standard.

The remote terminal configuration represented is a modified 2016.9 configuration. The modification entails substituting all digital subscriber line (DSL) related components (e.g. line cards) with POTS-only components. For remote terminals (RTs), cabinet costs are used rather than CEV or hut costs.

This methodology presents the most conservative (lowest) cost per user for a DLC system and is *not* representative of actual SBC deployment.

To compute the total remote terminal investment, a three-step process is employed:

Step 1 - Total Investment with Utilization per DS0

Equipment costs for the Litespan-2000 – 2016.9 Configuration includes such items as the cabinet, power, cooling and protection equipment, as well as common cards and panels.

The required quantity of each equipment item is multiplied by the material unit price to compute Total Material Price. The EF&I (Engineered, Furnished, and Installed) Loading Factor is then applied to the Total Material Price to compute the Total Investment. Dividing this total by the System DS0 capacity produces the Average Unit Investment per DS0. This result is then divided by the percent utilization (fill factor) to compute Total Investment with Utilization per DS0. See Figure 23.

Figure 23 – Total Investment with Utilization per DS0 (Step 1)

DLC - REMOTE TERMINAL COMMON - Litespan LS2000 - 2016.9 Configuration

Equipment Item	Quantity	Material Unit Price	Total Material Price	EF&I Loading	Total Investment
LS2000 LSC-2016 Cabinet, Equipped 9 CBA/Wired 9 CBA, 3 PDFA, MS2	1	$66,332.5200	$66,332.5200	3.26	$216,244.0152
LS2000 Getting Started Package, RT, Fiber Fed, (TCP3)	1	$6,316.5900	$6,316.5900	1.07	$6,758.7513
LS2000/2012 RT, Channel Bank Common Plug Package	8	$524.1400	$4,193.1200	1.07	$4,486.6384
Time Slot Interchanger V.4	8	$1,158.5400	$9,268.3200	1.07	$9,917.1024
Salt Batteries	6	$2,972.0000	$17,832.0000	3.26	$58,132.3200
Power Pedestal	1	$1,673.0000	$1,673.0000	3.26	$5,453.9800
Concrete Pad	1	$545.8400	$545.8400	3.26	$1,779.4384
Total Investment					$302,772.2457
System DS0 Capacity					2,016
Average Unit Investment					$150.1946
Percent Utilization					62.00%
Total Investment with Utilization per DS0					$242.2332

Step 2 - Total RT channel investment with utilization

The type of loop being studied determines the channel equipment costs that are used to compute RT Channel Investment. Channels per unit and channel DS0 capacity will also vary between equipment items.

In order to compute total material price, channel unit quantity is multiplied by material unit price. The EF&I loading factor is then applied to the total material price to compute the total investment per channel unit and divided by channels per unit to compute the average channel investment. This result is divided by the percent utilization (fill factor) to compute total RT channel investment with utilization. See Figure 24.

Figure 24 – Total RT Channel Units investment with Utilization (Step 2)

DLC - Litespan LS2000 - RT Channel Units

Equipment Item	Channels per Unit	Channel DS0 Capacity	Channel Unit Quantity	Material Unit Price	Total Material Price	EF&I Loading	Total Investment
Remote, POTS (4)	4	1	1	$175.9100	$175.9100	1.07	$188.2237
Universal Four Wire (2)	2	2	0	$416.1300	$0.0000	1.07	$0.0000
ISDN Basic Rate Interface (4)	4	3	0	$302.8000	$0.0000	1.07	$0.0000
ISDN Bank Power Supply	n/a	n/a	0	$0.5300	$0.0000	1.07	$0.0000
Async T1 Channel Unit (1)	1	24	0	$669.5900	$0.0000	1.07	$0.0000
Total Investment per Channel Unit							$188.2237
Channels per Unit							4
Average Channel Investment							$47.0559
Percent Utilization							62.00%
Total RT Channel Investment with Utilization							$75.8966

Step 3 - Total remote terminal investment

Total RT common investment per DS0 (step 1) is multiplied by total number of DS0s consumed per channel to compute total RT common investment per channel. This result is then added to the total RT channel investment (step 2) with utilization resulting in total remote terminal investment (step 3). The result is brought forward and applied to the calculations computed on the DLC – Expanded Summary worksheet. See Figure 25.

Figure 25 – Total Remote Terminal investment (Step 3)

Total RT Common Investment per DS0	$242.2332
Total Number of DS0s Consumed per Channel	1
Total RT Common Investment per Channel	$242.2332
Total RT Channel Investment with Utilization	$75.8968
Total Remote Terminal Investment	$318.1298

The computation for total central office terminal investment uses this same process.

4.6 Fiber Cable Unit Investment Worksheet

To compute the unit investment for underground and buried fiber cable, accounts 85C and 845C, respectively, the first step is to compute the Total Fiber Cost per Foot for each type of cable. Total Fiber Cost per Foot is the sum of Fiber Cost per Foot, Innerduct Cost per Foot and Contractor Cost per Foot.

Total Fiber Cost per Foot is then divided by the number of fibers per cable, which results in the Total Cost per Fiber Foot. This quotient is then multiplied by the number of Fibers per System to arrive at the Total Fiber Cable Cost per System Foot. Total Fiber Cable Cost per System Foot is subsequently divided by DS0 Capacity per DLC System, resulting in Cost per DS0 System Foot. This result is multiplied by the Number of DS0s Utilized and divided by the fill factor to compute the Total Investment per Circuit Foot (unit investment). Results for underground and buried fiber cable are brought forward and applied to the calculations on the Fiber Cable – Expanded Summary.

Figure 26 – Fiber Unit Investments

Fiber Unit Investment

Fiber Cost per Foot

Acc't	Fiber Cost Per Ft.	Innerduct Cost Per Ft.	Contractor Cost Per Ft.	Total Fiber Cost Per Ft.
85C	$6.9800	$0.3000	$2.5000	$9.7800
845C	$13.0000	$0.3000	$1.8500	$15.1500
822C	$8.0000	$0.3000	$0.8000	$9.1000

Fiber Cost per DLC System

Acc't	Total Fiber Cost Per Ft.	Fibers Per Cable	Total Cost Per Fiber Ft.	Fibers Per System	Total Fiber Cable Cost Per System Ft.	DS0 Capacity Per DLC System	Cost Per DS0 System Ft.	Total Number of DS0s Utilized	Fill Factor	Total Cost Per Ckt. Ft.
85C	$9.7800	48	$0.2038	4	$0.8152	2,016	$0.00040	1	62.00%	$0.00065
845C	$15.1500	48	$0.3156	4	$1.2624	2,016	$0.00063	1	62.00%	$0.00102
822C	$9.1000	48	$0.1896	4	$0.7584	2,016	$0.00038	1	62.00%	$0.00061

4.6.1 Fiber Feeder Length Worksheet

After the average fiber feeder length is determined in the sample summary, the cable mix for buried and underground fiber is applied. The cable mix is the percentage of buried

and underground fiber cable to total fiber feeder cable. The cable mix is obtained from company records. The total feet for buried and underground fiber is brought forward and applied to the calculations computed on the Fiber Feeder – Expanded Summary.

Figure 27 – Fiber Feeder Length

Fiber Feeder Lengths by Cable Type

Cable Size	Total Sample Feet	Aerial		Buried		UnderGround	
		Cable Mix	Total Feet	Cable Mix	Total Feet	Cable Mix	Total Feet
		5.00%		20.00%		75.00%	
48	15,452		773		3,090		11,589

4.7 Frame Stringer (Copper/DLC) - Main Distribution Frame Investment Worksheets

The Material Unit Investment and Engineered & Installed cost is brought forward from the Yearly Inputs. These values are multiplied by the quantity and summed to develop the subtotal of Unit Investment. A separate subtotal for the equipment requiring utilization is developed, and the appropriate utilization (fill) is then applied. All subtotals are added together to develop the Total Unit Investment. These results are carried forward to the Frame Stringer – Expanded Summary Unit Investment column.

Figure 28 - Copper Frame Stringer

Frame Stringer

Main Distribution Frame (Copper Feeder)

Equipment Item	Units	Quantity	Unit Investment	Total Unit Investment
Termination:				
Protector Unit - One each per Pair **	Pair	1	$2.0000	$2.0000
Protector Block per Pair	Pair	1	$3.6000	$3.6000
Riser Cable per Pair	Pair	1	$2.7000	$2.7000
Labor for Placing Prot. Block and Riser Per Pair	Hours	.01	$69.0000	$0.6900
Labor for Splicing Riser Cable Per Pair	Hours	.04	$69.0000	$2.7600
Frame Work and Lighting Per Pair	Pair	1	$1.3000	$1.3000
Sub-Total (requires utilization)				$11.0500
Forward Looking Utilization				65.00%
Sub-Total (with utilization)				$17.0000
Sub-Total (no utilization **)				$2.0000
Total Investment				$19.0000

Figure 29 - DLC Frame Stringer

Frame Stringer

Main Distribution Frame (Digital Loop Carrier - Derived Pair Configuration)

Equipment Item	Units	Quantity	Unit Investment	Total Unit Investment
Termination:				
Connector Block - per Pair	Pair	1	$0.5000	$0.5000
Labor for Placing Conn. Block Per Pair	Hours	.01	$69.0000	$0.6900
Frame Work and Lighting Per Pair	Pair	1	$1.3000	$1.3000
Sub-Total				$2.4900
Forward Looking Utilization				62.00%
Total Investment				$4.0161

Appendix A

Annual Cost Factors

SBC applies factors to calculate expenses for a service. These factors are a ratio of current expense to current investment. When this ratio is multiplied by the current investment in the cost study, the result is the current expense associated with the investment. SBC's use of factors makes the cost study flow easier to understand and audit.

SBC develops the following types of factors:

> ***Investment Factors*** calculate the capitalized expense SBC incurs when equipment is installed. Sales tax, engineering, and plant labor are expenses which must be treated as capital (i.e. investment). These factors determine the amount in addition to the purchase price of the equipment (may include vendor engineering and labor), to treat as investment.
>
> ***Investment Recovery Factors (depreciation, cost of money and income tax)*** identify the costs of purchasing equipment. Depreciation is the annual expense of recovering capital invested in telephone plant over the service life of the plant. When any company places equipment, it incurs a cost for the interest and dividends it must pay for the use of the money that bought the equipment. Because this cost of money is earnings, income tax must be paid on those earnings.
>
> ***Operating Expense Factors*** calculate the yearly operating cost associated with equipment. Maintenance and support assets are examples of this type of cost.

Factors are relationships between expense and investment. Expenses are current, but investments have been placed at different points in time. SBC applies a Current Cost to Book Cost ratio (CC/BC) when it develops factors to ensure that current expense is compared to current investment. Applying a CC/BC factor ensures that the cost factors develop the proper relationships.

> ***Inflation Factors*** are used to identify changes in costs that will occur during the study period. Inflation factors for equipment are based on the Telephone Plant Index (TPI), while inflation factors for labor expense are based on the Consumer Price Index (CPI). SBC uses the TPI or CPI, as appropriate, to assure that its costs reflect the best forecast of future cost changes in each particular case.

SBC's factor method is a sound means to project future expenses from current financial data. They identify the capital costs incurred when equipment is placed—cost of money, depreciation and income tax. They also identify operating expenses that will be incurred when equipment is placed. For these reasons, SBC's factor process is fundamentally sound, easy to audit, and an easy-to-understand method for identifying costs.